

WEST Search History

DATE: Saturday, May 31, 2003

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| <i>DB=USPT,PGPB; PLUR=YES; OP=OR</i> | | | |
| L20 | L19 and 149.clas. | 10 | L20 |
| L19 | L18 and l13 | 127 | L19 |
| L18 | L10 same (through or cylind\$) | 837 | L18 |
| L17 | L15 and l13 | 12 | L17 |
| L16 | L15 and 102.clas. | 5 | L16 |
| L15 | L10 same extrud\$ | 35 | L15 |
| L14 | L13 and l2 | 7 | L14 |
| L13 | L10 and (inflator or airbag or air adj bag or restraint) | 177 | L13 |
| L12 | L11 and (inflator or airbag or air adj bag or restraint) | 1 | L12 |
| L11 | L10 same l9 | 14 | L11 |
| L10 | hole same propellant | 1158 | L10 |
| L9 | L7 same (17 or 19) | 14 | L9 |
| L8 | L7 and l3 | 4 | L8 |
| L7 | hole adj4 propellant | 196 | L7 |
| L6 | L4 and (diphenylamine or diphenyl adj amine or resorcinol) | 8 | L6 |
| L5 | L4 and L3 | 20 | L5 |
| L4 | L2 same stabiliz\$3 | 55 | L4 |
| L3 | L2 and air adj bag | 68 | L3 |
| L2 | L1 same carbon | 2092 | L2 |
| L1 | ammonium adj nitrate | 14972 | L1 |

END OF SEARCH HISTORY

WEST

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L5: Entry 4 of 20

File: PGPB

May 23, 2002

DOCUMENT-IDENTIFIER: US 20020059969 A1

TITLE: Gas-generating compositions

Summary of Invention Paragraph (2):

[0001] The present invention relates to gas-generating compositions, more specifically to gas-generating compositions that are filled in an air bag system that expands an air bag of a vehicle passenger-protecting apparatus, or a pretensioner device that takes up a seat belt.

Summary of Invention Paragraph (4):

[0003] Preferable gas-generating compositions may: not degrade naturally; be resistant to environmental changes at ambient temperature; have appropriate burning rate; generate a large amount of gas without generating carbon monoxide and combustion residue; and be inexpensive. In order to obtain preferable gas-generating compositions, gas-generating compositions that include ammonium nitrate as the major component have been developed. For example, Japanese Patent Application Laid-Open No. Hei 10-59792 discloses a gas-generating composition consisting of an oxygen-containing binder and ammonium nitrate. Also, Japanese Patent Application Laid-Open No. 2000-103691 discloses a gas-generating composition consisting of a macromolecular compound such as polyacrylic macromolecular compound, polyacetal, urea resin, melamine resin, ketone resin and cellulose macromolecular compound, and ammonium nitrate or phase-stabilized ammonium nitrate.

Detail Description Paragraph (12):

[0022] The amount of compounding ammonium nitrate is preferably between 80 and 94 wt % with respect to the total amount of the organic polymer binder and the stabilizer, and preferably between 85 and 93 wt % when considering the amount of gas generated by the gas-generating composition and that the carbon monoxide is not substantially generated. The content of the oxidant is specifically preferred to be between 89 and 92 wt %. When the content is less than 80 wt %, the amount of gas generation decreased, and there is a tendency to generate carbon monoxide within the generated gas. When the content exceeds 94 wt %, the burning rate is smaller and it is difficult to sustain combustion under relatively low pressure.

Detail Description Paragraph (15):

[0025] The content of the organic binder is preferably between 5 and 15 wt % with respect to the total weight of ammonium nitrate, the organic binder, and the stabilizer. When the mechanical property, burning rate, and carbon monoxide concentration within the generated gas of the gas-generating composition are considered, the content of the organic binder is further preferably between 7 and 14 wt %, specifically between 6 and 13 wt %. When the content of the organic binder exceeds 15 wt %, though the mechanical property of the gas-generating composition grain is improved, the combustion performance of the gas-generating composition is degraded as the compounding rates of other ingredients decreased and therefore the burning rate tend to become slower. The gas-generating composition will generate carbon monoxide. The mechanical property of the gas-generating composition will degrade when the content of the organic binder is less than 5 wt %.

Detail Description Paragraph (20):

[0030] The content of the stabilizer is preferably between 0.05 and 4 wt % with respect to the total weight of ammonium nitrate, the organic binder, and the stabilizer. When considering the combustion performance of the gas-generating composition and generation of carbon monoxide, the content is further preferably between 0.1 and 3 wt %, specifically between 0.1 and 2 wt %. The properties of the gas-generating composition degrade by the ambient changes when the content is less than 0.05 wt %. On the other

hand, when the content exceeds 4 wt %, the burning rate of the gas-generating composition becomes slower, and carbon monoxide is generated within the generated gas.

Detail Description Paragraph (40):

[0050] The timing for actuating an automotive air bag system is later than the timing for actuating a pretensioner system, specifically in between 30 and 75 ms after the collision of the automobile. Accordingly the gas-generating compositions for air bag systems need to complete combustion in 30 to 75 ms. Gas-generating composition grains preferable for the air bag systems are the grain having a through-hole 3 as shown in FIG. 1(b) of which wall thickness between 0.5 and 7 mm, diameter between 3 and 50 mm, through-hole diameter between 1 and 40 mm and length between 3 and 50 mm, or the grain having a plurality of through-holes 3 as shown in FIGS. 1(c) through 1(h) of which wall thickness between 0.5 and 7 mm, diameter between 3 and 50 mm, through-hole diameter between 1 and 10 mm and length between 3 and 50 mm.

Detail Description Paragraph (41):

[0051] There is a tendency that a necessary amount of gas-generating composition can not be filled in the gas generator used for an air bag system in the case in which the diameter or the length exceeds 50 mm. When the wall thickness exceeds 7 mm, the time required for completing the combustion becomes longer, and use of such form in the air bag systems is not preferable.

Detail Description Paragraph (46):

[0056] Ammonium nitrate is contained in the gas-generating composition at an amount sufficient to convert all of the carbon atoms, which are included in the components subjected to oxidation in the gas-generating composition and having at least one of carbon and hydrogen atoms, into carbon dioxide, and all of the hydrogen atoms into water. Preferably ammonium nitrate is contained in the gas-generating composition in a stoichiometrical proportion by weight of between 1.0 and 1.4. By doing so, during the combustion, the gas-generating composition generates a gas that mainly includes carbon dioxide and water and carbon monoxide is not substantially generated.

Detail Description Paragraph (47):

[0057] In a gas-generating composition, ammonium nitrate is included at between 80 and 94 wt %, organic binder, between 5 and 15 wt %, and stabilizer, between 0.05 and 4 wt %. Such compounding sets the content of ammonium nitrate, a granular component, in an appropriate range to maintain the mechanical property. Further, the ratio between ammonium nitrate, the oxidant, and the organic binder, the reductant (fuel), is set in an appropriate range. Accordingly, the gas-generating composition burns at a preferable rate in the combustion of the gas-generating composition, and a gas that may not substantially include carbon monoxide can be generated at a relatively large amount.

Detail Description Paragraph (53):

[0061] A mixture of ammonium nitrate having average grain diameter 15 .mu.m at 89.1 wt %, cellulose acetate at 8.3 wt % and polyoxyethylene dodecylamine (produced by NOF Corporation by product name NYMEEN L202) at 0.5 wt %, activated carbon having the specific surface area approximately 950 m.sup.2/g at 1.6 wt % and diphenylamine at 0.5 wt % was prepared. Ethyl acetate at 50 wt % was added to the mixture and mixed uniformly in a Werner-type kneader. Note that a Werner-type kneader is a mixer equipped with at least a stirring blade.

Detail Description Table CWU (1):

1 Components of Example 2 Ammonium nitrate 88.9 wt % Cellulose acetate 8.5 wt % NYMEEN L202 0.1 wt % activated carbon 1.8 wt % diphenylamine 0.7 wt % Components of Example 3 Ammonium nitrate 88.9 wt % Cellulose acetate 6.4 wt % NYMEEN L202 3.5 wt % activated carbon 0.9 wt % diphenylamine 0.3 wt % Components of Example 4 Ammonium nitrate 80.5 wt % nitrocellulose 12.5 wt % NYMEEN L202 0.5 wt % copper oxide 3.5 wt % diphenylamine 3.0 wt % Components of Example 5 Ammonium nitrate 80.5 wt % nitrocellulose 12.9 wt % NYMEEN L202 0.1 wt % copper oxide 3.5 wt % diphenylamine 3.0 wt % Components of Example 6 Ammonium nitrate 80.5 wt % nitrocellulose 9.5 wt % NYMEEN L202 3.5 wt % copper oxide 3.5 wt % diphenylamine 3.0 wt % Components of Example 7 Ammonium nitrate 86.0 wt % PELPRENE 10.5 wt % NYMEEN L202 0.5 wt % copper oxide 3.0 wt % Components of Example 8 Ammonium nitrate 86.0 wt % PELPRENE 10.9 wt % NYMEEN L202 0.1 wt % copper oxide 3.0 wt % Components of Example 9 Ammonium nitrate 86.0 wt % PELPRENE 7.5 wt % NYMEEN L202 3.5 wt % copper oxide 3.0 wt %

Detail Description Table CWU (3):

3 Components of Comparative Example 1 Ammonium nitrate 88.9 wt % Cellulose acetate 8.6 wt % activated carbon 1.8 wt % diphenylamine 0.7 wt % Components of Comparative Example

2 Ammonium nitrate 80.5 wt % Cellulose acetate 13.0 wt % Copper oxide 3.5 wt %
diphenylamine 3.0 wt %

CLAIMS:

6. The gas-generating composition according to claim 1, wherein the ammonium nitrate is contained in the gas-generating composition at a stoichiometrical proportion of 1.0 to 1.4 with respect to components having at least one of hydrogen and carbon atoms that are subjected to oxidation within the gas-generating compositions.

7. The gas-generating composition according to claim 1, wherein the gas-generating composition contains the ammonium nitrate at an amount enough to convert all carbon atoms in the gas-generating composition into carbon dioxide and to convert all hydrogen atoms in the gas-generating composition into water.